

Nesting Behavior of the Crested Oropéndola (*Psarocolius decumanus*) in Northern Trinidad, B.W.I.¹

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(Plates I & II; Text-figures 1-3)

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INTRODUCTION

THE oropéndolas or giant caciques constitute an assemblage of neotropical birds, within the family Icteridae, made up of five genera (*Ocyalus*, *Zarhynchus*, *Chypicterus*, *Gymnostinops* and *Psarocolius*) and 12 species. They are among the largest passerine birds of the New World tropics, reaching 21 inches in

length, and are characterized by similar social habits, colonial nesting, vocalizations and display patterns. Their dominant colors are shades of black and brown with yellow or orange characteristically present in the tail and bill. Another closely related group of icterids are the true caciques (i.e., *Cassiculus* spp.) which, although quite similar in habits and appearance to the oropéndolas, average smaller in size. Previous studies on the 12 species comprising the oropéndolas have been limited to the life history studies of the Wagler Oropéndola (*Zarhynchus wagleri*) by Chapman (1928) and the Montezuma Oropéndola (*Gymnostinops montezuma*) by Skutch (1954).

The Crested Oropéndola or Giant Crested Cacique (*Psarocolius decumanus insularis*) is uniform brownish-black in general coloration, becoming chestnut on the rump and under tail coverts; the tail is lemon yellow with the middle pair of rectrices brownish-black; the bill pale greenish-yellow; the tarsi and toes black and the iris blue. The sexes are similar in color but differ in size, the female averaging 13 inches in length and the male 17 inches. Five subspecies of this oropéndola are recognized, ranging from Panamá across northern South America south to southern Brazil, Paraguay, northeastern Argentina, eastern Peru and eastern Bolivia. The race *insularis* is restricted to the islands of Trinidad and Tobago and northeastern Venezuela. The genus *Psarocolius* also includes the Green Oropéndola (*P. viridis*), the D'Orbigny Oropéndola (*P. atro-virens*) and the Chestnut Oropéndola (*P. angustifrons*).

Two nesting colonies of the Crested Oro-

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péndola were discovered in early January, 1955, in the cocoa plantation and secondary forest near Simla about four miles north of the town of Arima in the Northern Range of Trinidad. This area is situated in the Arima Valley at an elevation of 800 feet, and is bordered by lower montane rain forest which was, in all probability, the original forest type of the study area. For further ecological details of meteorology and biotic zones of this region see Beebe (1952). Both nesting sites were established in long-boled mountain immortelle or erythrina trees (*Erythrina micropteryx*) with the sack-like nests hanging some 60 to 80 feet from the ground. These immortelles are familiar nesting sites of the Crested Oropéndola in the Arima valley, and are common trees on the cocoa plantations where they were originally introduced as cover for the cocoa.

The birds were still in the process of nest-building when their sites were found. A blind was constructed on a slope opposite the more accessible colony (Colony A) at a level with most of the nests and about 100 feet away. This colony was visited daily from Jan. 12 to March 29 for a total of 303 hours. The second colony (Colony B), about a quarter of a mile from the first, was visited weekly from Feb. 6 to April 3 for a total of 15 hours. Observations were made with the aid of 7 × 50 binoculars, and moving pictures and photographs of special activities were taken through a six-inch or 300 mm. telephoto lens. The majority of the observation periods took place between 9:00 A.M. and noon in the morning and 2:30 P.M. to 6:00 P.M. in the afternoon. However, a number of observations were also made between dawn and 9:00 A.M. and from 6:00 P.M. to darkness.

Since it was not possible to look into the inaccessible nests, it was especially important to keep them under frequent observation in order to determine any change in rhythm of the nesting visits. In this manner a good approximation of the dates of egg laying and hatching could be made. It was felt that the observation periods were of such regularity that determination of these dates is accurate to within 24 hours. Unless otherwise stated, the figures given for the frequency of the attentive and inattentive periods of the parent at the nest during the various nesting phases are included only if the period of observation exceeded three hours. A nest visit implies complete entry into the nest, except on those occasions during advanced feeding when the female fed the nestling without entering the nest.

The average monthly maximum and minimum temperatures at Simla for Jan., Feb. and

March, 1955, were 61-89, 66-88 and 66-88° F. respectively. The total monthly rainfall for the same months was: Jan., 2.20; Feb., 2.29; March, 2.68 inches.

I am especially grateful to Dr. William Beebe for his many helpful suggestions during this study as well as for placing his highly informative notes at my disposal. I also wish to thank Miss Rosemary Kenedy for assisting me so generously in the photographic phases of this work. Dr. Edward J. Alexander of the New York Botanical Garden kindly identified the nesting material.

THE NESTS

Twenty-three nests were begun at colony A (Plate I, Fig. 1), of which 11 were completed, and at colony B, 14 nests were begun, all of which were completed. The nests at colony A were fairly evenly distributed throughout the tree, whereas at colony B they were bunched together on one side of the tree. Incidentally, at another colony of Crested Oropéndolas, found on March 14 in an adjacent valley at an elevation of about 1,500 feet, the nests were suspended in an immortelle tree some 50 feet above the ground and were all arranged very closely together for a horizontal distance of only about 20-25 feet. Eighteen nests appeared to have been started, of which 14 seemed complete. During a half hour's watch feeding of the nestlings was observed at four separate nests.

High winds apparently take a considerable toll of nests. Four nests (three occupied and one unoccupied) at colony B, and one unoccupied nest at colony A, fell during heavy winds. Two of these fallen nests seemed typical and measurements are given in Table 1.

A great increase in the length of the nest opening and the dispersal of the leaf lining is apparent between incubation and the third week of feeding. Another unoccupied nest, obviously abnormal, measured seven feet in length and weighed 312 grams.

Examination of these nests showed that they were composed largely of the stripped leaf fibers of bromeliads (Bromeliaceae) and heliconia (Musaceae) and stems of vines (Cucurbitaceae). The leaves used in lining the bottom of the nests on the inside were almost exclusively those of the immortelle (*Erythrina micropteryx*). According to Goeldi (1897, 1903) the Crested Oropéndola from southern Brazil employs the fibers of the bromeliad *Tillandsia usneoides* almost entirely as a nesting material, whereas near the Amazon, orchid roots and elongated roots of the rhizomorph *Marasimius* sp. are used. Young (1929) describes a nest

TABLE 1. MEASUREMENTS OF TWO NESTS OF *Psarocolius decumanus*, IN INCUBATING AND FEEDING NESTING STAGES

Nesting phase	Length	Width	Length of opening	Weight (gms.)		
				Fiber	Leaf lining	Total
Incubating	2'10"	8"	5"	93.1	87.7	180.8
Feeding	2'11"	9"	1'5"	178.8	4.1	182.9

from British Guiana as made up of narrow strips of cane leaves, plantain bark, cocoanut fiber and vines. He also states that two or three nests are sometimes built by the same female.

The color of some broken egg shells recovered from a fallen nest was a pale bluish-green or, by comparison with Ridgway (1912), Pale Glaucous Green.

THE PRE-INCUBATION AND INCUBATION PERIODS

Dr. William Beebe (unpublished notes) noted nest building in the Crested Oropéndola to be under way in the Arima valley as early as Dec. 5 (1952) and Dec. 23 (1953) and as late as March 4 (1950). Belcher & Smooker (1937) reported that in Trinidad and Tobago nest building began in December and eggs were found from mid-January onwards, with May 24 as the latest date.

The nesting colonies near Simla were not discovered until Jan. 9, 1955, at colony B and Jan. 11 at colony A, at which time nest building was well advanced at both sites. There had been no activity at either tree in late December, 1954, and nest building therefore must have begun either in late December or early January and lasted about two weeks.

Sixteen of the 23 nests started at colony A were being actively worked on during the observation period on Jan. 12. On the following day, however, with 12 nests still incomplete, only two nests were visited by the birds during almost eight and one-half hours of observation. Although most of the nests were no longer actively visited after Jan. 12, there was considerable activity in the nest tree between Jan. 13 and Jan. 18. Periodically small groups made up mainly of females, many of which carried nesting material, would fly into the top of the tree. Here they would remain for varying periods of time, clucking noisily, but with only a few exceptions they made no further attempts at nest building.

Of the 16 nests being built on Jan. 12, only eight were observed to be revisited for the purpose of nest building on subsequent days; one was visited once, two were visited twice, one was visited five times and one was visited six

times, and at only three were visits continued to egg laying and incubation. These last three nests (1, 2 and 3) showed no similarity in the length of time between the end of nest-building and the start of incubation. This pre-incubation activity is summarized in Table 2.

The earliest onset of incubation took place at nest 1 on Jan. 20. In all probability, this nest was completed prior to Jan. 12. Nest 2, however, was not completed until Jan. 14, and incubation did not begin until Feb. 5. Nest 3 appeared to be complete on Jan. 12, with incubation commencing on Feb. 6.

Just why colony A was seemingly abandoned is difficult to explain, for it appeared to be thriving. The observation post was well camouflaged with canvas and concealed by vegetation, in addition to being situated some 100 feet from the nest tree. Moreover, these birds are not particularly known for their shyness, and active colonies are to be found in well-populated areas. In fact, colony B flourished despite its proximity to a rock quarry where frequent blasting was taking place. Dr. Beebe has noted that in the previous three years, as well as the following year (1956), this site always contained medium-sized colonies.

As can be seen by Table 2, nests 2 and 3 were visited frequently and fairly regularly before incubation. It appeared that incubation was under way at nest 3 on the afternoon of Jan. 20, as the female remained in her nest for periods ranging from 23 to 112 minutes during three and a half hours of observation. However, from Jan. 21 to 30 no further activity was noted at nest 3. With this one exception, the length of time spent in the nests at each visit was usually less than a minute, and exceeded five minutes on only three occasions.

Oftentimes, nests 2 and 3 were visited in seemingly unaccountable spurts over relatively short periods of time. The most outstanding example of this behavior took place at nest 2 on the morning of Jan. 29 where, within a period of 44 minutes, the nest was visited briefly 22 times.

The significance of this pre-incubation activity

TABLE 2. PRE-INCUBATION ACTIVITY BY THE FEMALE PARENTS AT COLONY A

Date	Total observation time (min.)	Number of visits per hour			Average time in nest (min.)		
		Nest 1	Nest 2	Nest 3	Nest 1	Nest 2	Nest 3
Jan.							
12	173	0.6	0.3	1.3	<1.0	<1.0	<1.0
13	501	0	0.1	0	0	<1.0	0
14	540	0	0.4	0	0	<1.0	0
15	575	0	0	0.1	0	0	<1.0
16	285	0	0	0	0	0	0
17	410	0.8	0	1.1	<1.0	0	<1.0
18	444	0.9	2.0	1.8	3.7	1.3	<1.0
19	240	0.7	2.7	0.8	<1.0	2.0	9.0
20	210	*	1.1	1.1	*	0.8	58.6
21	180		0	0.6		0	<1.0
22	350		4.1	0		3.1	0
23	245		1.7	0		1.3	0
24	370		0	0		0	0
25	215		2.0	0		2.3	0
26	226		0.5	0		<1.0	0
27	361		4.1	0.1		4.5	<1.0
28	131		3.2	0.4		6.0	<1.0
29	131		11.9	0.9		0.8	<1.0
30	190		2.0	1.2		6.7	4.7
31	352		1.7	0.8		4.4	<1.0
Feb.							
1	170		0.3	0.3		20.0	<1.0
2	350		0.6	1.3		7.5	<1.0
3	80		0	0		0	0
4	83		0.7	2.4		<1.0	<1.0
5	341		*	0		*	0
6				*			*

*Onset of incubation.

is not clear. Since nests 1, 2 and 3 were complete by Jan. 14, after which no nesting material was brought to the nests, and no nest weaving detected, these facts appear to eliminate the possibility that the hens involved were giving "finishing touches" to their nests. Activity ranged from the apparent pseudo-incubation behavior at nest 3 on Jan. 20 to the extremely frequent nesting visits at nest 2 on Jan. 29.

The beginning of incubation was determined by observing the increase in the duration of the attentive periods by the female at her nest. In colony A, the laying of the first egg at nest 1 occurred on Jan. 20, at nest 2 on Feb. 5 and at nest 3 on Feb. 7. The incubation period at all three nests lasted approximately 15 days. During this time the average time spent on the eggs was 74.6% at nest 1, 72.0% at nest 2 and 67.9% at nest 3. The frequency and duration of the attentive periods are indicated in Table 3 and Text-figures 1-3. The percentage of time spent in the nest was determined by dividing the average length of the attentive periods by the sum of the average attentive periods and

multiplying by 100. The number of visits per hour at all nests ranged from 0.5 to 1.9, averaging 1.0 at nests 1 and 3 and 0.8 at nest 2.

For at least seven days prior to egg laying, the female parents at nests 2 and 3 were seen to return to their empty nests at the onset of darkness, and presumably spent the night there. The times of these final entries, as well as those noted during incubation proper, varied from about 5:55 to 6:20 P.M.

THE NESTLING PERIOD

With the sudden increase in the number of nest visits per hour, the hatching of the first egg was considered to have taken place. This occurred at nest 1 on Feb. 4, at nest 2 on Feb. 21 and at nest 3 on Feb. 22. As with incubation, all parental care was undertaken by the females.

The length of nestling life varied from 31 to 32 days at nest 1 and 34 or 35 days at nest 2 to 36 days at nest 3. The amount of time that the hen spent in the nest with the newly-hatched young decreased gradually to less than about 20%. We can refer to this as the brooding

period. At nest 1 this brooding period lasted for seven days, at nest 2 for 11 days and nest 3 for nine days. After the last day of brooding the frequency of visits ranged from 3.2 to 8.5 per hour, averaging 5.7, 5.6 and 5.9 at nests 1, 2 and 3 respectively. Time spent at the nest was usually less than 5% at nests 2 and 3 during the post-brooding period, the length of the average visit being but a few seconds. At nest 1, however, it varied from 5% to 15%, a factor which might possibly have been due to the presence of more than one nestling.

After the cessation of brooding, the females stayed with their nestlings all night for a varying number of days. At nest 1, this period extended for 11 days after hatching, or 34% of the nestling stage; at nest 2 for 26 days (74%), and at nest 3 for 23 days (63%).

The exact nature of the food brought to the netslings could not be determined; however, large orthopterous insects or lepidopterous larvae were frequently noted. Excrement packets were periodically removed from the nests.

By the 18th or 19th day of feeding, the whining of the nestlings, as well as their movements within the nests, could be detected. The young birds are either able to see through the nest wall, or can hear the wing sound of the approaching parent, as often this whining began even before the hen had reached the nest. It usually continued on through the feeding and for a few minutes after she had left. The male can also bring about this whining, for on one occasion a male flying to a branch near an occupied nest caused the young to whine. This, incidentally, induced the male to explore the nest curiously, but he did not enter.

During the early days of feeding the hen entered the nest entirely. But as the nest opening became enlarged by her frequent passage and the nestling increased in size, she fed it either while perching at the nest entrance (Plate I, Fig. 2), or while clinging to the side of the nest.

In the last days of nestling life, the young bird at nest 3 was sometimes seen to climb entirely out of the nest. Then, while clinging to the side and flapping its wings, it would at times completely circle the nest before re-entering.

Nest-leaving took place at nest 1 sometime between 11:30 A.M. on March 7 and 3:30 P.M. on March 8 (31 or 32 days after hatching), at nest 2 between 3:49 P.M. on March 27 and 8:09 A.M. on March 28 (34 or 35 days after hatching) and at nest 3 at 9:07 A.M. on March 29 (36 days after hatching). The following notes were taken on the morning of nest-leaving at nest 3:

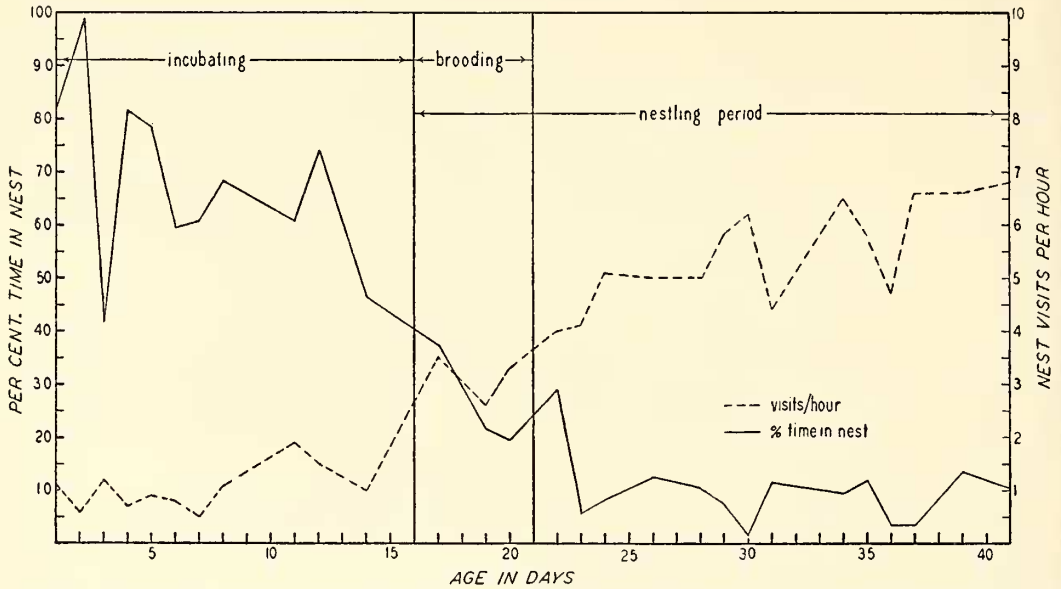
- 7:49 A.M. Observer entered blind.
- 7:50-8:53 Nestling fed on 5 separate occasions.
- 9:02 Nestling had head out of the nest opening before hen reached nest; after being fed it climbed completely out of the nest, perching at the entrance and peering about for a few minutes before re-entering.
- 9:07 After being fed, the nestling perched at the nest entrance for a few seconds, then exercised its wings momentarily and flew off in a fairly strong, slightly descending flight, alighting in a tree some 75 feet away.
- 9:08 Fledgling whined and vibrated wings while being fed.

TABLE 3. PER CENT. OF TIME SPENT IN THEIR NESTS BY THE FEMALE PARENTS AT COLONY A DURING THE INCUBATION AND BROODING PERIODS

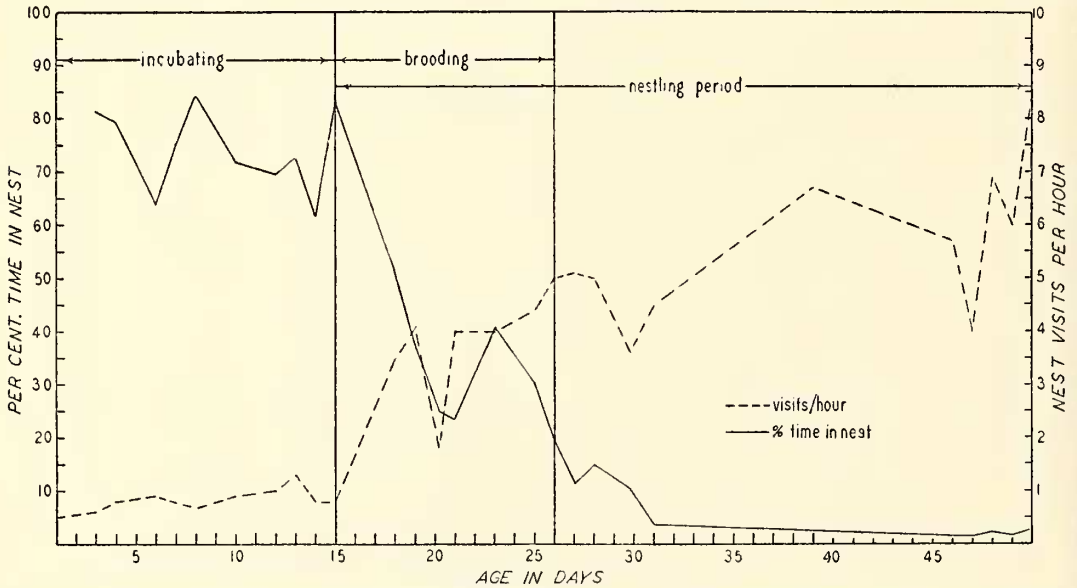
Number of days after egg laying	Nest 1 Jan. 20*	Nest 2 Feb. 5*	Nest 3 Feb. 7*
Incubation			
1	81.8	—	81.0
2	98.8	—	71.8
3	41.6	81.3	—
4	81.6	79.8	73.0
5	78.1	—	58.5
6	59.4	63.9	66.1
7	60.7	75.1	—
8	68.1	84.5	75.4
10	60.9	—	73.9
11	60.9	—	71.2
12	74.0	69.5	65.1
13	—	72.9	85.0
14	42.6	61.5	—
15	—	83.2	72.0
Brooding			
16	—	56.0	—
17	31.9	27.1	59.0
18	—	52.3	23.0
19	22.8	38.3	34.1
20	21.5	44.3	34.5
21	—	25.0	—
22	31.6†	—	24.7
23	—	42.1	28.4
24	—	—	23.7†
25	—	32.4	—
26	—	22.1†	—

*Probable dates of egg laying.

†Last day brooding observed. Percentages not included if observation period was less than 3 hours.



TEXT-FIG. 1. Frequency of nest visits and duration of attentiveness by female parent at nest 1 in colony A.



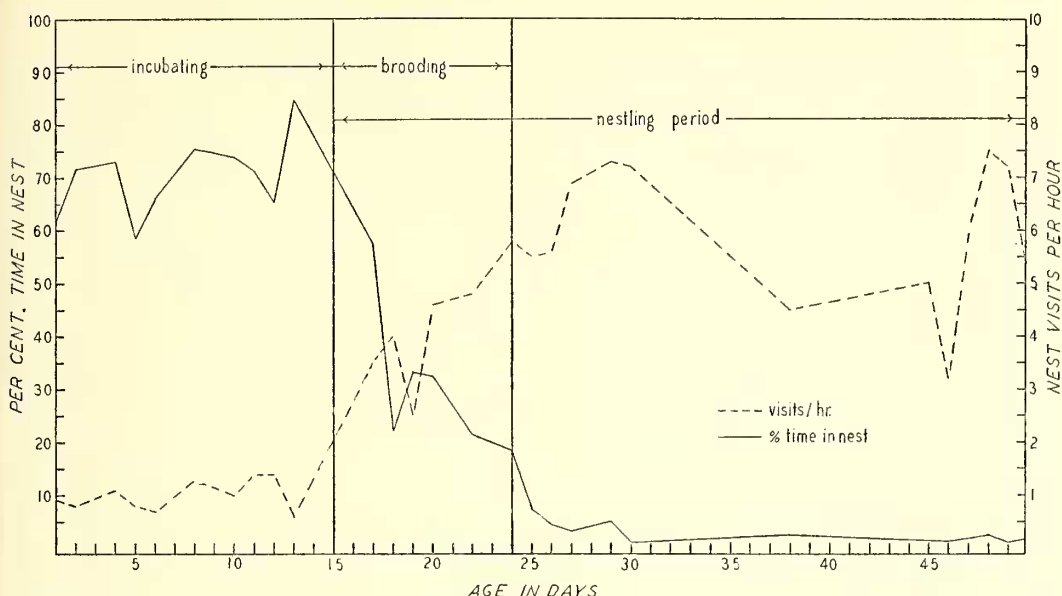
TEXT-FIG. 2. Frequency of nest visits and duration of attentiveness by female parent at nest 2 in colony A.

- 9:09 Fledgling flew to another perch about 25 feet away where it remained perching quietly.
- 9:25 Fledgling fed by hen.
- 9:30 Fledgling flew to another tree about 50 feet distant, again remaining quiet after landing.
- 9:43 Fledgling flew off again; no longer observable.

No more than one nestling was seen at any of the nests at colony A.

VOCALIZATION AND DISPLAY

At first hearing, any description of the various calls of the male Crested Oropéndola appears hopeless, as there does not seem to be any particular pattern to his polyphonic and diverse utterances. However, after prolonged and careful listening, they were recognized as falling into four groups:



TEXT-FIG. 3. Frequency of nest visits and duration of attentiveness by female parent at nest 3 in colony A.

CALL 1. An introductory *whaaa cheeee* with the second phrase higher and followed by a continuous, unmusical trill:

whaaa
cheeee

notes usually repeated five times on the same level:

ko ko ko ko ko

CALL 2. Introduction a rising unmusical trill (*rrrrrrrrrup*) followed by *cheow* *wow*, *eow woo woo* or *cheeeeow*, not unlike the meow of a cat:

cheow *wow*

CALL 3. An introductory *cheeee* (falling in pitch), or a rising *brrrrrree*, *cheeeeow* or *rrrrrrrrrup*, usually diminishing in intensity, followed by *lob lob baah* or *ko ko plo*, repeated three or more commonly four times; the first two notes are given rapidly and the last is drawn out:

ko ko plo ko ko plo ko ko plo

CALL 4. An introductory *peeeeow* or *cheeee* (falling) or *rrrrrrrup* (rising), diminishing in intensity, followed by a series of *ko*, *plo* or *kok*

The most common was Call 1 which comprised 45% of all of those heard. Call 2 was given 24% of the time, Call 3, 16%, and Call 4, 15%.

On numerous occasions the male was heard to utter a confusion of stuttering, gurgling notes, containing some of the elements of a typical display call but wholly lacking in pattern: *oooouuuuuu whup whaaaat upka brrrrrr woo woe whup wheet brrrreew woo*, etc. This was accompanied by much gurgling, feather rustling and wing flapping. It was almost as though a young male were attempting to imitate the call of an adult and failing badly. Every once in a while a male would rather half-heartedly begin a display, but never really finish. Both the abortive gurgling and the unfinished calls were heard during all nesting periods.

Calls 1, 2 and 3 usually accompanied a display, whereas Call 4 was apparently given in the absence of any display.

The male was seen to go through his complete display not only in the presence of females, but also when alone or in the company of males. Dr. Beebe observed two males simultaneously going through a complete display while facing each other. They were some distance from the nest

tree, and no females were noted in the vicinity.

In the typical display, the bird begins by bending forward in a deep bow until his head is well below the perch. At the same time he ruffles his body feathers and brings the extended wings together over the back. The wings are then vibrated rapidly with the primaries open. Almost immediately after the wings are extended, the tail is brought forward quickly over the back until it makes an approximate 90° angle with the back (Plate II, Figs. 1 & 2), and remains in this position from 1.5 to 1.9 seconds. Then, as the tail begins to lower to its normal position, the wing beats become less rapid and take on a flapping or fanning quality which lasts from 1.1 to 2.6 seconds. Sometimes, however, the wing beat does not slacken until the tail has been completely lowered. Finally, the wing flapping stops and the bird comes out of his bow, the entire performance lasting about four to five seconds. These times are based on the analysis of moving pictures taken of five complete displays. The average duration of the four main phases of the display are as follows:

1. Tail elevated forward over back. 0.20 seconds
2. Wings brought together over back and vibrated. 1.74 seconds
3. Tail lowered to normal position. 0.36 seconds
4. Wing fanning or flapping 1.97 seconds

The intervals between beats in the wing-fanning phase were measured at 0.03 seconds. Although not actually measured, many of the display calls seemed to last around five to seven seconds. In all probability, the figures above would have averaged higher if more displays had been analyzed.

Although the spreading of the tail feathers was not noted in the present study, Young (1929) reported it in *Psarocolius decumanus* from British Guinea. This tail spreading during the display is probably characteristic of all oropéndolas, as Fuertes (1916) observed it for the Montezuma Oropéndola and Chapman (1928) for the Wagler Oropéndola.

Displays were frequently performed on the nests proper. In this type of display, the male flew directly to the nest and, clinging to its side, began the display almost immediately upon alighting. The head was always directed downward. In such a position only the initial bowing of the perching display was, of necessity, omitted. Twenty-eight per cent. of all displays at the nest tree were of this type. Crandall (1914) also described this type of nest display for the Montezuma Oropéndola in Costa Rica.

During the 303 hours of observation at colony

A, 683 displays were counted either at the nest tree or from the immediately surrounding trees. The displays from the nest tree numbered 320, and those from the nearby trees, 363. The frequency of displays given on or near the nest tree ranged from 0.1 to 10.2 per hour, with an average of 2.2 per hour throughout all nesting periods. At no time of the day was the display observed to be given more frequently.

Often a male would fly to a nest and perform no display. On the other hand, there were instances where a male displayed on as many as five different nests in succession. There seemed to be no particular preference in selecting the nests to display on, and oftentimes an occupied nest was flown to while a hen was incubating, whereupon she would usually vigorously chase the male just as she would a cowbird. Sometimes when a group of males were in the nest tree and one of them flew to a nest, another male would chase it off and, as though stimulated by this chase, then go through a complete nest display. On one occasion this type of behavior was repeated three times in the course of about three minutes by the same pair in the same respective roles. It was a fairly common practice for males accompanying returning females to the nesting colony to display almost as soon as they arrived in the nest tree.

The most common note of the female was a *cluck* which she sometimes uttered repeatedly for considerable periods of time while perching, preening or flying about the nest tree. Often, when she first came to the nest tree after an inattentive period, during either incubation or feeding, she clucked continuously sometimes up to 15 minutes before finally entering her nest. Less frequently she carried on this clucking after leaving the nest. When annoyed or disturbed, the clucking became more rapid. Although not noted for certain, the male probably also gives a similar *cluck* note. Skutch (1953) reports this in the male Montezuma Oropéndola. In chasing cowbirds, males or other females from her nest or its vicinity, the hen generally voiced a harsh, nasal mewling rising at times to a high-pitched whine.

As is characteristic of all oropéndolas and caciques, a warning *cack* is given by the male at the approach of danger. This seemed to be most often brought on either by the sight or scream of the Gray Hawk (*Buteo nitidis*), or the sudden appearance of man. Frequently after the sounding of an alarm *cack*, the oropéndolas present failed to leave the nest tree or its immediate area, and incubating hens rarely left their nests.

COWBIRD ACTIVITY

The visitations of Giant Cowbirds (*Psomo-*

colax oryzivorus) to colony A were carried on with persistent regularity between Jan. 13 and March 4. On the latter date the nestlings were 26 to 43 days old. After March 4 only one further cowbird visit was noted, on March 23. On 34 of the 50 days between these dates, cowbirds were seen coming to the nest tree at one time or other on 52 separate visits. Cowbird activity was recorded on 77% or 29 of the 37 days in which the observation periods lasted longer than three hours.

It was interesting to note that on 34% of their visits, the cowbirds came to the nest tree following returning female oropéndolas. In the majority of cases only one cowbird visited the colony at any one time. However, on five occasions two cowbirds came to the nest tree together, and once a group of four came in together.

Usually the cowbirds immediately began inspecting a series of nests. At colony A most of the nests were unoccupied. The process of the inspecting consisted in momentarily peering into the nest opening, and only on two occasions were cowbirds seen to enter the nests completely. If the nest happened to be occupied by an incubating female, she would always give her scolding whine and usually give immediate chase. The cowbird was chased for only a short distance, after which the female oropéndola would usually immediately return to her nest. Often the same cowbird would return immediately, only to be chased again from the same or other nests. Only three instances were noted when an incubating or brooding female did not leave her nest to chase a cowbird, but instead merely voiced a scolding whine from within. On several occasions cowbirds were chased from unoccupied nests by females who happened to be either returning or leaving their nests. These chases were not especially energetic, however, and pursuit was not vigorous.

Male oropéndolas were rarely seen to chase cowbirds, and when both cowbirds and males were in the nest tree at the same time, neither seemed very disturbed by the other's presence even when perched only a few feet apart. If cowbirds remained quietly in the nest tree they were never observed being chased even by females.

Cowbirds were never noted to remain for very long in the nest tree during inspecting visits. The average length of time was only two to three minutes.

From all indications, cowbirds appeared to have had little success in parasitizing any nests at colony A. Only two nests were ever observed to be entirely entered, and these for but a few seconds.

THE NESTING AT COLONY B

The various nesting phases at both colonies were relatively comparable. On the first day of observation at colony B (Feb. 6) nestlings were present in three nests and incubation was under way in five of the 11 nests eventually occupied. On the same date at colony A, one nest contained young and two were incubating. As shown in Table 4, three of the 14 original nests were never occupied, and of the remaining 11, three fell, leaving eight (73%) of the occupied nests to produce fledged young.

Nest number 3, which the nestlings had left by March 6, was seen to be revisited on March 13. During observation periods in the following three weeks a female was seen to visit it, but the nature of the visits could not be determined with any certainty. This might possibly be an instance of the rearing of a second brood. In 1956 Dr. Beebe noted nest activity by females at colony A as late as June 4, again indicating the possibility of a second brood.

The general activity at colony B was much the same as that at colony A, but naturally on a larger scale. The times of the various nesting phases were similar, with incubation lasting about two weeks and feeding from about four to five weeks.

MISCELLANEOUS OBSERVATIONS

Most of the time the females went about their various activities independently. However, it was not uncommon to see two hens leave or return to their respective nests at the same time. This was observed not only when they left the nests for the first time in the morning and at the final entry at the coming of darkness, but also during regular daytime activity. For ex-

TABLE 4. SUMMARY OF THE NESTING PHASES FOR THE OCCUPIED NESTS AT COLONY B. (I=incubating; N=nestling period; F=nestlings fledged; X=nest fell; R=nest reoccupied).

Nest	February				March				April
	6	13	20	27	6	13	20	27	3
1	—	I	X						
2	N	N	N	X					
3	N	N	N	N	F	R?			
4	N	N	N	N	F				
5	I	I	I	N	N	X			
6	I	I	N	N	N	F			
7	I	I	I	N	N	N	N	F	
8	—	I	I	N	N	N	N	F	
9	—	I	I	N	N	N	N	F	
10	I	I	I	N	N	N	N	N	F
11	I	I	I	N	N	N	N	N	F

ample, on March 4 the three females at colony A, who were feeding their nestlings, either entered or left their nests 218 times during six and a half hours of observation. On 23 (10%) of these nest entries or departures, two females were seen either to leave or arrive at their nests together.

Copulation was seen on but one occasion at the nest tree; this took place in the late afternoon (6:00 P.M.) on Feb. 2. The male approached one of a pair of females and displayed, after which he began to peck at her cloacal area. The female fluttered her wings but otherwise remained fairly still. The male then engaged in a brief copulatory act and followed this by pecking at her cloacal region once more, while she squatted and fluttered her wings again slightly. The male then went through another complete display.

Other than the cowbirds, all species of birds that visited the nest tree at colony A remained unmolested. Once a Gray Hawk (*Buteo nitidis*) flew into the nest tree and perched undisturbed for a few minutes before flying off. It was apparently unseen by the oropéndolas of the colony, as the recognized presence of a hawk in the vicinity would invariably elicit the sounding of the alarm *cack*. Once at colony B, when a Gray Hawk flew overhead, several oropéndolas took off in pursuit.

DISCUSSION AND SUMMARY

The nesting activity of two colonies of the Crested Oropéndola (*Psarocolius decumanus insularis*) in the Northern Range of Trinidad, B.W.I., was studied from the end of nest building to nest leaving by the young. Fourteen nests were completed at one colony all of which were later occupied, and 11 were completed at the other, of which three were occupied. The relative length of the various nesting phases as well as the general activity were similar at both colonies. Nesting success at the colony with the three occupied nests was 100%, and at the colony with the 11 occupied nests, 73%. Nest building and care of the young were undertaken entirely by the females. The following discussion and summary are based on the observations at the colony containing the three occupied nests.

The period from the completion of nest building to the beginning of incubation varied from 7 to 25 days with the incubation period proper lasting 15 or 16 days. This is but slightly longer than the incubation of 11 to 14 days reported in the literature for the family Icteridae. The average time spent on the eggs ranged from 68% to 75%.

The nestling period varied from 31 to 36 days, and brooding from 7 to 11 days. These nestling periods do not vary significantly from those of 30 to 37 days given by Chapman (1928) and Skutch (1954) for two other oropéndolas: *Gymnostinops montezuma* and *Zarhynchus wagleri*. After the cessation of brooding the females remained with the nestlings at night from 11 to 26 days, or 34% to 74% of the nestling period.

The different phases of the male perch display were analyzed with the aid of motion pictures. Comparisons with the descriptions in the literature of the display of other oropéndolas (*Psarocolius decumanus*, Chapman, 1894, Young, 1929; *Gymnostinops montezuma*, Fuertes, 1916, Skutch, 1954; and *Zarhynchus wagleri*, Chapman, 1928) emphasize the marked similarity of the sequence of display phases among oropéndolas. This similarity is brought out in Plate II, which compares the perch displays of the Crested and Green Oropéndola. Displays were frequently performed on the nests proper, and 28% of all displays at the nest tree were of this type. The frequency of all displays given on or near the nest tree averaged 2.2 per hour throughout all nesting periods.

The various calls of the male were analyzed and found to fall into four separable groups. These calls, although of a similar quality to those reported for other oropéndolas (*op. cit.*), appear to differ considerably, not only within the oropéndola complex, but also within the same genus. Beebe (unpublished notes) records *Psarocolius decumanus* from Trinidad as calling wholly unlike *Psarocolius angustifrons* from Venezuela; and Friedman & Smith's (1950) description of the call of *Psarocolius decumanus* from northern Venezuela does not seem to resemble closely any of the calls of the Trinidad birds.

Persistent cowbird activity was noted from the termination of nest building on to advanced feeding, at which time the nestlings were 26 to 43 days old. During this period cowbirds were seen to visit the colony to inspect nests on about 77% of the observation days. This type of persistence by Giant Cowbirds was also noted by Skutch (1954) in a colony of Montezuma Oropéndolas.

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EXPLANATION OF THE PLATES

PLATE I

- FIG. 1. View of colony A from observation blind (February).
- FIG. 2. Female parent feeding nestling in nest 3 at colony A (March).

PLATE II

- FIGS. 1 & 2. Male Crested Oropéndolas (*Psarocolius decumanus*) displaying in nest tree at colony A.
- FIG. 3. Beginning of display in the male Green Oropéndola (*Psarocolius virens*). New York Zoological Park.
- FIG. 4. End of display in the male Green Oropéndola. Note bow is deeper than in *P. decumanus*.